Case Report

Complexities in Diagnosis and Management of Long Face

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ABSTRACT

A long face with increase in the lower anterior facial height (LAFH)has its own share of complexities with regard to its diagnosis and management. The point of importance is to carefully diagnose and differentiate if the cause of the long face is due to the increase in the upper 1/3rd or the lower 2/3rd of the Lower anterior facial height. Although there are well established protocols in the management caused due to the increase in the upper 1/3rd such as orthognathic surgery, mini implants and intrusion arches, management caused due to the increase in the lower 2/3rd has rather limited option.

This article describes the management of a patient with a long face caused due to an increase in only the lower 2/3rd of the LAFH with a vertical reduction genioplasty and also focusses on the diagnostic criteria required to differentiate the various causes for a long face.

Key words: Long face, Diagnosis, Management.

INTRODUCTION

Long face commonly referred to as increased facial height in orthodontic terminology have well defined diagnostic criteria and standard protocols of management. However, it has it's own share of variability's especially with reference to the importance of soft tissues in contemporary orthodontic diagnosis and the advent of temporary anchorage (TAD's) This article would give a foresight into the recent trends in the diagnosis and management of long face.

Long face is an analogy for a patient with leptoprsopic facial form which means having a long or a long and narrow face with a facial index of 88.0 to 92.9 as measured on the living head and 90.0 to 94.9[1] on that of a skull. Patients with long face are usually associated with increased lower anterior facial height, reduced bizygomatic width, narrow apical base and a steep mandibular plane angle.

ETIOLOGY OF LONG FACE

The main causes for a patient to develop a long face are

- Increased oral/nasal airflow ratio
- Muscle weakness
- Resting tongue posture
- Heredity

DIAGNOSTIC CHARACTERISTICS

Obtaining proper history from the patient with a thorough clinical examination and radiographical examination is very essential to arrive at a proper diagnosis of any clinical condition. Patients with long face can be diagnosed taking into consideration the four following characteristics such as Skeletal characteristics, Dental characteristics, Soft tissue characteristics and Cephalometric characteristics.

SKELETAL CHARACTERISTICS

The normal vertical facial proportion is divided in equal proportions between the upper, middle and lower 3rd.[2] The upper third extends from the hairline to the glabella, the middle third from the glabella to the subnasale and the lower 3rd from the subnasale to the soft tissue menton. The height of the lower 3rd of the face is commonly referred to as Lower Anterior Facial height (LAFH).

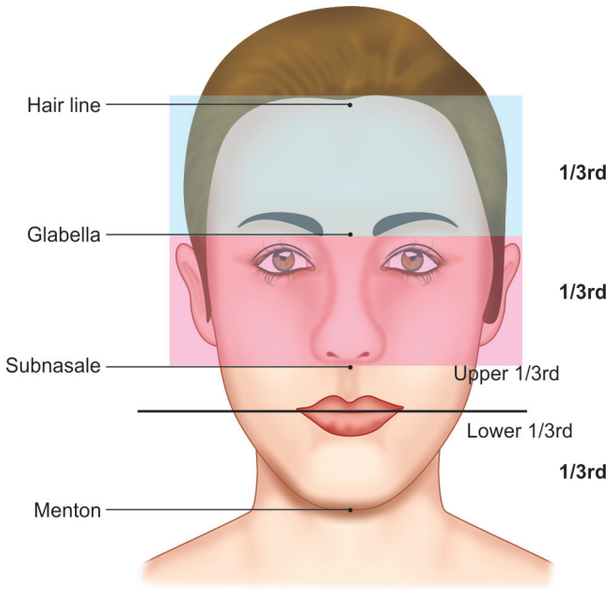

Figure 1 Normal vertical facial proportions

It is mainly the lower 3rd of the face which is under preview of care of the orthodontist and this article would focus only on the variability in the lower 3rd of the LAFH

LOWER 1/3rd OF THE FACE (LAFH)

The lower 1/3rd of the face is further divided into 2 parts:

- upper 1/3rd and
- lower 2/3rd

The upper 1/3rd extends from the soft tissue subnasale to the line joining the commissure of the lip. The commissure of upper lip is defined as the line drawn perpendicular to alar of the nose. The lower 2/3rd is from the commissure of the lip and the soft tissue menton **(Figure 2)**.[3]

The criteria of paramount importance is to diagnose and differentiate if the increase in the LAFH is caused by theUpper 1/3rd or Lower 2/3rd which decides the treatment plan.

The increase in the upper 1/3rd of the face is characterized by vertical maxillary excess clinically (VME) showing lip incompetence and excess gingival show.[4]

There are different well estbalished modes of treatment for VME depending on the severity of the problem ranging from Surgery ,Temporary anchorage devices and Intrusion arches.

The introduction of Temporary anchorage devices (TAD's) have put the orthodontist in a catch 22 situation of when to use TAD's for Intrusion or do the rather invasive procedure of a surgical Lefort Impaction. **(Figure 3)**. Although the envelope of discrepancy states that in the upper arch the amount of intrusion that can be achieved using skeletal anchorage is 6mm, around 4mm of intrusion wasfound to be stable.[5]

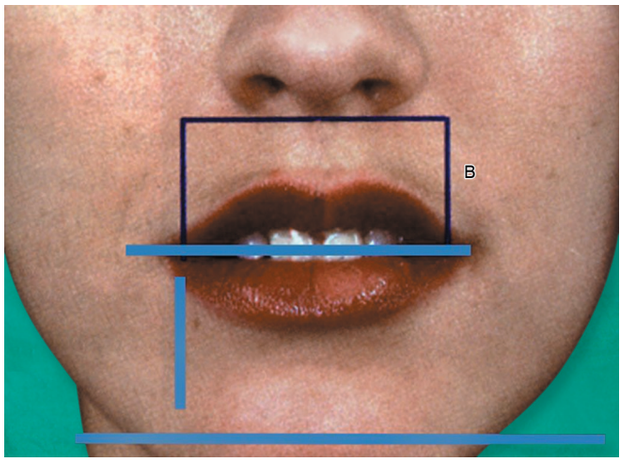

Figure 2 Normal lower 1/3rd of the face

Figures 3A and B (A) Increase in the upper 1/3rd of the LAFH (Gummy Smile); (B) Increase in the lower 2/3rd of the LAFH (Normal Smile line)

The general consensusis that if the amount of impaction required is more than 5mm the ideal choice of treatment would be a Lefort 1 osteotomy **(Figures 4A and B)**. The required amount of surgical impaction depends upon the Cephalometric prediction taking into consideration both the hard tissue and soft tissue profile. The Lefort 1 impaction usually associated with Autorotation which further enhances the overall impaction.Though the envelope of discrepancy states that the amount of intrusion that can be achieved using surgical management is 10mm, the amount of intrusion that can be practically achieved by orthognathic surgery is around 8mm in the incisor region and around 5 mm in the molar region.[6]

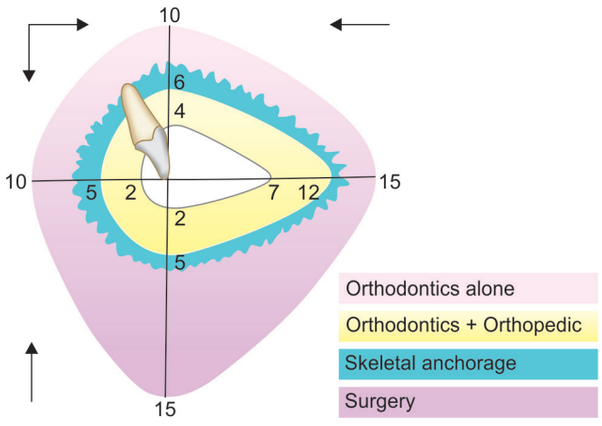

Figure 4 Addition of 4th Modality (Skeletal Anchorage) to the Envelope of Discrepancy

Figures 5A and B (A) Pre-treatment photographs of patient with increase in the Upper 1/3rd of the LAFH; (B) Post-surgical photographs

The advent of mini-implants in orthodontics has changed the way patients with skeletal maxillary excess can be approached especially in borderline surgical cases as quite a number of patients are reluctant to undergo surgery. Mini implants can be used for both anterior intrusion and whole arch intrusion which brings about the auto rotation of the mandible reducing the VME and LAFH simultaneously.

The major advantage of mini-implant intrusion is that there is no reciprocal effects on the rest of the dentition. If the need for intrusion is not too severe it can always be treated with the wide range of intrusion arches like 3-piece intrusion arches or rickets utility arch.

Vertical Maxillary excess (VME) which has been discussed above has many different protocols for management,However the increase in the lower 2/3rds have limited modes of management. Clinically the patient presents with a normal gingival smile line which negates the need for Upper arch Impaction or Intrusion. The daignosis and managment of a case with an increase in LAFH where only the lower 2/3rd is increased is discussed below.

A 23 year old patient reported with a chief complaint of a long face and crowding in the upper and lower dental arches. Extra oral examination revealed an increase in the LAFH which was confined only to the lower 2/3rd of the face. There was no excessive gingival show negating the need for any maxillary intrusion and the nasiolabial angle was average.

Intra-orally there was Class I molar and Canine relationship with reduced overjet and overbite.Minimum crowding was seen in both upper and lower arches with proclination of the anteriors more prominent in the lower arch compared with the upper arch.Cross bite in relation to the upper right second premolar was also present.

Cephalometric analysis also revealed an increase in the LAFH with an increased gonial angle and a deficient chin.

The treatment plan was mainly focused in correcting the long face which was the chief complaint of the patient. Since the problem in the LAFH was only confined to the lower 2/3rd it was decided to do a Vertical Reduction Genioplasty to reduce the LAFH combined with an advancement genioplasty to correct the deficient chin and not impaction or intrusion in the upper arch which would reduce the incisal show creating an aged appearance.

Intra-oral examination revealed a reduced overjet and overbite with minimum crowding of the upper arch (Arch perimeter analysis showed a discrepancy of 5.5 mm in upper arch) it was decided to extract the upper second premolars.

Figure 6 Increase in lower 2/3rd of the LAFH

Table 1
Pretreatment cephalometric analysis

Variables	*Pre-treatment*	*Normal*
Sagittal Skeletal Relationship		
SNA	77°	82 + –2°
SNB	74°	80 + –2°
ANB	3°	2 + –2°
Wits Appraisal	AO ahead of BO by 2 mm	0 mm
Dental Base Relationship		
Upper Incisor to NA (mm/deg)	10.5 mm/24°	4 mm/22°
Lower Incisor to NB (mm/deg)	13 mm/38°	4 mm/25°
Upper Incisor to SN Plane	99°	102°
Lower Incisor to Mandibular Plane Angel (IMPA)	102°	90°
Dental Relationship		
Inter-incisal Angle	116°	131°
Lower Incisor to APo Line	7 mm	0-2 mm
Over Bite	0 mm	3.2 + –0.7 mm
Over Jet	0 mm	3.2 + –0.4 mm
Vertical Skeletal Relationship		
Maxillary-mandibular Plane Angles	37°	25°
SN Plane-mand Plane	40°	32°
Upper Anterior Facial Height	55 mm	
Lower Anterior Facial Height	78 mm	67-70 mm
Jarabak Ratio	58.39%	62-65%
Maxillary Length	90 mm	93.6 mm
Effectve Mandibular Length	118 mm	120.03 mm
Soft Tissues		
Lower Lip to E-line	5 mm	–2 mm
Nasolabial Angle	102°	90-110°

Table 2
Cephalometric analysis

Variables	*Pre-treatment*	*Post-treatment*
Sagittal Skeletal Relationship		
SNA	77°	78°
SNB	74°	76°
ANB	3°	2°
Wits Appraisal	AO ahead of BO by 2 mm	AO ahead of BO by 1.5 mm
Dental Base Relationship		
Upper Incisor to NA (mm/deg)	10.5 mm/24°	7 mm/22°
Lower Incisor to NB (mm/deg)	13 mm/38°	9 mm/33.5°
Upper Incisor to SN Plane	99°	102°
Lower Incisor to Mandibular Plane Angel (IMPA)	102°	99°
Dental Relationship		
Inter-incisal Angle	116°	121.5°
Lower Incisor to APO Line	7 mm	5 mm
Over Bite	0 mm	2 mm
Over Jet	0 mm	3 mm
Vertical Skeletal Relationship		
Maxillary-mandibular Plane Angles	37°	32°
SN Plane-mand Plane	40°	38°
Upper Anterior Facial Height	55 mm	55°
Lower Anterior Facial Height	78 mm	74.5°
Jarabak Ratio	58.39%	59.25%
Maxillary Length	90 mm	90 mm
Effectve Mandibular Length	118 mm	123 mm
Soft Tissues		
Lower Lip to E-line	5 mm	–2 mm
Nasolabial Angle	102°	109°

Figure 7 Intraoral pre-treatment photograph

Figure 8 Pre-treatment Cephalogram

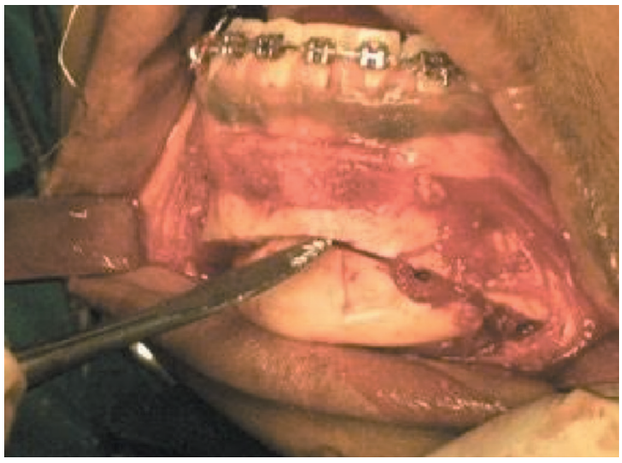

Figure 9 Vertical reduction and advancement genioplasty

Figure 10 Post-treatment intraoral photographs

For the lower arch it was planned to extract the lower first premolar to get a good overjet and overbite and correct the lower incisor proclination.

The case was started with 022 Roth prescription. After the initial levelling and aligning stage, retraction was started on a 19 × 25 Stainless steel wire with soldered hooks and elastic module bringing controlled tipping of the upper and lower anteriors.A high Transpalatal Arch at a distance of 5mm away from the palate was placed to bring about some molar intrusion and also to prevent extrusion of the upper molar during retraction.

The case was finished maintaining a Class I Molar and Canine relationship. The Overjet and Overbite were corrected and the dental oclusion was stable.

Figure 11 Post-treatment extra oral photographs

Figure 12 Comparision of pre- and post showing a reduction in the LAFH

Figure 13 Post-treatment cephalogram

Based on the cephalometric prediction a vertical reduction genioplasty of 4.5 mm and a horizontal advancement of 5mm was surgically performed. This procedure balanced the proportions of the vertical 3rds.of the face.Retention protocol used was an Upper Essix retainer and lower lingual bonded retainer.

Comparison of the Pre and Post treatment Cephalometric values also confirmed the skeletal and dental corrections achieved.

DISCUSSION

The treatment plan mentioned in this article for the patient with increase in the lower 2/3rd of the LAFH corrected the lip incompetence to a great extent and reduced the lower anterior facial height by 4.5 mm. Since the patient had a deficient chin, the combination of an advancement genioplasty contributed to the overall improvement of the profile.

Fish et al.[7] explained about two treatment modalities for correction of vertical maxillary excess. First one is the surgery

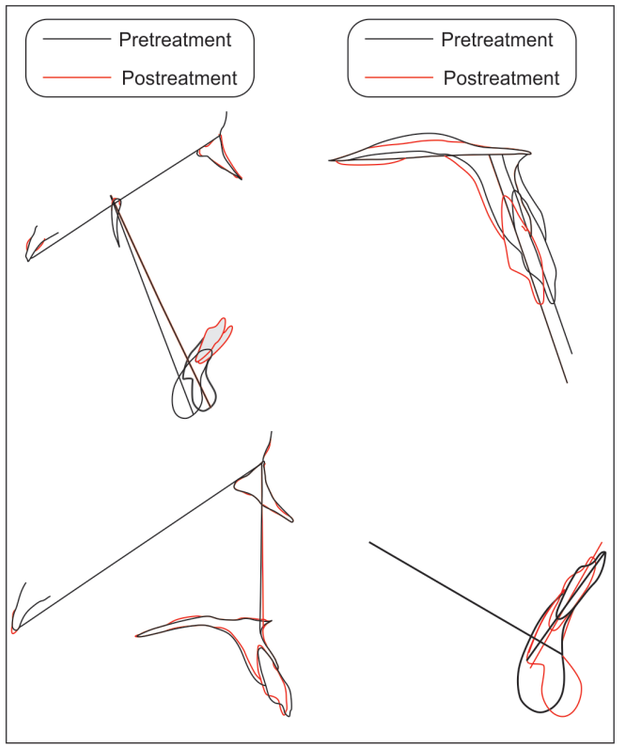

Figure 14 Cepholmetric superimpositions

first approach which is mostly followed in the cases of class 1 malocclusions where the maxilla is surgically superiorly repositioned and slightly anteriorly while maintaining the same occlusal relations. He also explained about the cases where there will be need for pre -surgical orthodontics. It includes the cases of class 2 malocclusion with severe curve of spee or severe crowding.

R.S. Conley et al.[8] explained about the treatment of cases with vertical maxillary excess and anterior open bite and transverse maxillary deficiency. The vertical maxillary excess and the open bite can be corrected by le-fort1 osteotomy with superior impaction followed by bilateral split sagittal osteotomy and mandibular advancement. This aided in rotation of the mandible in counter clockwise direction and correction of overjet, proclination and the chin position.

Garlington et al.[9] explained about the effect of extraction of second premolars on patients with high mandibular plane angle. They stated that there was significant forward rotation of the mandible in the patients with increased lower anterior facial height after the extraction of second premolars.

Proper examination of the patient's skeletal, dental, soft tissue, and cephalometries is very essential for patients with long face to arrive at a proper diagnosis based on which the treatment plan is formulated to achieve a functionally stable occlusion and an esthetic soft tissue profile.

CONCLUSION

Management of a casewith a long face involves either orthodontic treatment of the malocclusion or the combination of both orthodontic and surgical treatments.The rule of thumb should be in diagnosing if the cause of the LAFH is due to the increase in the upper 1/3rd or the lower 2/3rd which decides the treatment plan.

Although there are different established protocols for managing the increase in the upper 1/3rd management of cases with increase in the lower 2/3rd of the face has limited options. If the problem is only confined to the lower 2/3rd of the LAFH, a combined orthodontic treatment with a vertical reduction genioplasty has proved successful in balancing the vertical proportions of the face.

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